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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/663,051	09/15/2003	Gordon Ma	068736.0232	1994

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EXAMINER

LEE, EUGENE

ART UNIT PAPER NUMBER

2815

DATE MAILED: 07/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/663,051

Applicant(s)

MA ET AL.

Examiner

Eugene Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 April 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7-10, 12, 13, 15-19, 21-24, 26, 27, 29-33, 35-38, 41 and 42 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-10, 12, 13, 15-19, 21-24, 26, 27, 29-33, 35-38, 41 and 42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/25/05 has been entered.

Specification

2. The disclosure is objected to because of the following informalities: the word “conducting” should be “conductivity” (see, for example, page 3, line 6 of the specification). This informality appears numerous times in specification and should be corrected in all instances. Appropriate corrections are required.

Claim Objections

3. Claims 9, 12, and 26 are objected to because of the following informalities: it appears the limitation “the ring” is referring to the “ring shaped region” in line 9 of claim 1; claims 12 and 26 are dependent on cancelled claims. Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1 thru 3, 9, 10, 12, 13, 15, 16, 18, 19, 23, 24, 26, 27, 29, 30, 32, 33, 37, 38, 41, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nojiri 2001/0045670 A1 in view of Williams et al. 5,386,136. Nojiri disclose (see, for example, FIG. 2, and FIG. 1) a semiconductor device comprising a p-type well (active region of a first conductivity type) 3, including NMOS transistors (two transistor structure) N1 comprising an n-type diffusion regions (first stripe shaped source region/second stripe shaped source region) 7, common drain (stripe shaped drain region) 6, first and second stripe shaped channel, and first and second gates. Nojiri does not disclose a ring shaped region of the first conductivity type extending from a surface of the active region into the active region, wherein the ring shaped structure overlaps the first and second stripe shaped source region and, thus, substantially surrounds the transistor structure. However, Williams discloses (see, for example, FIG. 9) a semiconductor device comprising N⁺ regions (first source region/second source region), N⁺ region (drain region) 908, P body (ring shaped region), and deep P⁺ regions (first and second sinker structure; see claim 2 of application) 129a. In column 8, lines 29-32, Williams discloses the P body as annular. The P body and deep P⁺ regions provide a contact to the P⁺ buried layer 905 which is a field shaping and latch suppressing structure. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have a ring shaped region of the first conductivity type extending from a surface of the active region into the active region, wherein the ring shaped structure overlaps the first and second stripe shaped source region and, thus, substantially surrounds the transistor structure in order to form a field shaping and latch suppressing structure.

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Regarding claims 2, 18, and 33, see, for example, FIG. 9 wherein Williams discloses deep P⁺ regions (first and second sinker structure).

Regarding claims 3, 9, 23, and 37, see, for example, FIG. 9 wherein Williams discloses the P body is doped less than the deep P⁺ regions.

Regarding claims 10, 24, and 38, Nojiri in view of Williams does not disclose the ring being doped in the range of 1014-1015/cm². However, doping the ring in the range of 1014-1015/cm² is a result effective variable for the withstand voltage of a semiconductor device. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have the ring doped in the range of 1014-1015/cm² in order to establish the withstand voltage of the semiconductor device, and since it has been held that discovering an optimum value of a result effective value involves only routine skill in the art. In re Boesch, 617 F. 2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claims 12, and 26, see, for example, FIG. 2 wherein Nojiri discloses substrate 2, and regions (epitaxial layer) 3,4.

Regarding claim 15, 29, and 41, Nojiri in view of Williams does not disclose using boron as a dopant. It was also extremely well known in the art to use boron as p-type dopant in semiconductor devices. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to use boron as a dopant in order to form a p-type region in a semiconductor device since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

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6. Claims 4, 7, 21, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nojiri '670 A1 in view of Williams '136 as applied to claims 1-3, 9, 10, 12, 13, 15, 16, 18, 19, 23, 24, 26, 27, 29, 30, 32, 33, 37, 38, 41, and 42 above, and further in view of Fulford, Jr. et al. 5,844,276. Nojiri in view of Williams does not disclose the drain region comprising a lightly doped drain region. However, Fulford discloses (see, for example, FIG. 12) a semiconductor device comprising a drain region 76, and LDD area (lightly doped drain region) 56. It would have been obvious to one of ordinary skill in the art at the time of invention to have the drain region comprising a lightly doped drain region in order to suppress leakage current.

7. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nojiri '670 A1 in view of Williams '136 in view of Fulford, Jr. et al. '276 as applied to claims 4, 7, 21, and 35 above, and further in view of Leong 6,372,557 B1. Nojiri in view of Williams in view of Fulford does not disclose a metal layer on the backside of the semiconductor device. However, Leong discloses (see, for example, Fig 3L) a semiconductor device comprising a bottom side metalization layer (metal layer) 138. In column 4, lines 48-52, Leong discloses the bottom side metalization layer facilitates electrically grounding a substrate. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have a metal layer on the backside of the semiconductor device in order to facilitate electrically grounding the substrate of a semiconductor device.

8. Claims 8, 22, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nojiri '670 A1 in view of Williams '136 as applied to claims 1-3, 9, 10, 12, 13, 15, 16, 18, 19,

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23, 24, 26, 27, 29, 30, 32, 33, 37, 38, 41, and 42 above, and further in view of Leong 6,372,557

B1. Nojiri in view of Williams does not disclose a metal layer on the backside of the semiconductor device. However, Leong discloses (see, for example, Fig 3L) a semiconductor device comprising a bottom side metalization layer (metal layer) 138. In column 4, lines 48-52, Leong discloses the bottom side metalization layer facilitates electrically grounding a substrate. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have a metal layer on the backside of the semiconductor device in order to facilitate electrically grounding the substrate of a semiconductor device.

9. Claims 17, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nojiri '670 A1 in view of Williams '136 as applied to claims 1-3, 9, 10, 12, 13, 15, 16, 18, 19, 23, 24, 26, 27, 29, 30, 32, 33, 37, 38, 41, and 42 above, and further in view of Gajda et al. 6,780,714 B2. Nojiri in view of Williams does not disclose the ring comprising at least one gap. However, Gajda discloses (see, for example, FIG. 5) a semiconductor device comprising a P diffusion ring region 15a separated by gaps 14x. In column 8, lines 54-56, Gajda discloses the gaps having no substantial effect on the ring operation of region 15a. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have the ring comprising at least one gap since such a gap has no substantial effect on the operation of the semiconductor device and provides another way of efficiently forming the guard ring with less dopant.

Response to Arguments

10. Applicant's arguments with respect to claims 1-5, 7-10, 12, 13, 15-19, 21-24, 26, 27, 29-33, 35-38, 41, and 42 have been considered but are moot in view of the new ground(s) of rejection.

INFORMATION ON HOW TO CONTACT THE USPTO

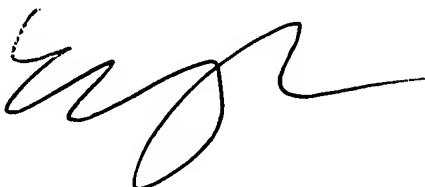
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugene Lee whose telephone number is 571-272-1733. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 571-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Eugene Lee

June 28, 2005

A handwritten signature in black ink, appearing to be 'Eugene Lee', written in a cursive style.